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EXAMINER

LEE, CHRISTOPHER E

ART UNIT	PAPER NUMBER
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2112

DATE MAILED: 02/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/730,780

Applicant(s)

PORTERFIELD, A. KENT

Examiner

Christopher E. Lee

Art Unit

2112

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-60 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-60 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Receipt Acknowledgement***

1. Receipt is acknowledged of the Amendment filed on 19<sup>th</sup> of December 2003. Claims 1, 3-6, 10, 18, 19, 21-14, 28, 34, 36, 37, 41, 42, 45-51 and 57 have been amended; no claim has been canceled; and no claim has been newly added since the last Office Action was mailed on 30<sup>th</sup> of September 2003.

Currently, claims 1-60 are pending in this application.

### ***Claim Objections***

2. Claims 10, 28, 45 and 55 is objected to because of the following informalities:

The claims 10, 28 and 45 recite the preambles “the method of 6” in line 1 of the claim 10, “the method of 24” in line 1 of the claim 28, and “the system of 42” in line 1 of the claim 45, respectively. However, it is not clear to claim if the numbers in the preamble points out their parent claims, respectively. The Examiner assumes the numbers in the preambles of the claims 10, 28 and 45 are pointing out their parent claims, respectively, for the purpose of the claim rejections based on a prior art.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1-15, 18, 34-38, 41-50 and 57-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et al. [US 6,539,444 B1; hereinafter Kondo] in view of Frame et al. [US 5,349,690 A; hereinafter Frame].

*Referring to claims 1 and 34*, Kondo discloses a bus arbitration method (See Fig. 2 and col. 4, line 48 through col. 5, line 10) for a processor based system (Fig. 12), said system comprising a hub device, which is a link hub (i.e., bus adapter 4 in Fig. 12) coupled to a processor (i.e., processor 1 in Fig. 12) by a processor bus (i.e., processor bus 3 in Fig. 12) and coupled to a memory device (i.e., main

memory 2 in Fig. 12) by a memory bus (i.e., memory bus 11 in Fig. 12), said hub device being connected to a first device, which is a satellite device (i.e., any one of module #1, #2, #3,... ; e.g., module #1 6 of Fig. 12) by a link bus (i.e., system bus 5 in Fig. 12), said method comprising the steps of issuing, from one of said first device and said hub device, an arbitration request on said link bus (i.e., requesting a bus mastership of a system bus from a module, e.g., module #1 in Fig. 2; See col. 4, lines 62-63); and transferring control (viz., bus releasing) of said link bus (i.e., system bus) from a bus master (e.g., module #0 in Fig. 2) to said device (i.e., module #1 in Fig. 2) issuing said arbitration request (See col. 4, lines 60-66), wherein control of said link bus is granted by said hub device (i.e., bus adapter 4 in Fig. 12).

Kondo does not expressly teach the steps of determining, at said first device and said hub device, whether control of said link bus can be transferred from said bus master to said device issuing said arbitration request; and if it is determined that control of said link bus can be transferred, said transferring control of said link bus from said bus master to said device issuing said arbitration request, wherein control of said link bus is granted by said first device and said hub device.

Frame discloses a fair arbitration scheme (See Abstract), wherein determining (i.e., determining which enabled node has the highest priority), at a first device (e.g., node 12 in Fig. 1) and a hub device (e.g., node 16 in Fig. 1), whether control of a link bus (i.e., use the interconnect bus 10 in Fig. 1) can be transferred from a bus master (e.g., node 18 in Fig. 1; i.e., prior bus winning device, as an example) to said device (i.e., enabled message node 12 in Fig. 1, which has a higher priority than node 16's) issuing an arbitration request (See col.2, lines 29-44); and if it is determined that control of said link bus can be transferred (i.e., winning the control of the bus; See col. 2, lines 45-51), transferring control of said link bus to said device issuing said arbitration request (i.e., allowing the winning node 12 to use the interconnect bus; See Abstract), wherein control of said link bus is granted by said first device and said hub device (See col. 2, lines 45-46; i.e., wherein in fact that the nodes 12-18 determine which of the nodes

12 and 16 wins the control of the bus in the arbitration block in Fig. 2 clearly implies control of said link bus is granted by said first device and said hub device).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said fair arbitration scheme, as disclosed by Frame, in said method steps of said bus arbitration, as disclosed by Kondo, for the advantage of providing all of said devices (i.e., nodes) connected to said link bus (i.e., interconnected bus) have an equal opportunity to use said bus, but without inefficiencies created by reserving time for each device to use said bus (See Frame, col. 1, lines 50-54).

*Referring to claims 2 and 35*, Frame teaches said first device, which is said satellite device, and said link hub (i.e., node 12 and node 16 in Fig. 1) determine if control of said link bus should be transferred by inspecting respective internal arbitration state (i.e., monitoring bus idle state 40, wait phase 48, selection 50 and transfer phase 52 in Fig. 2) and status information (i.e., arbitration loser, arbitration winner status of enabled message node or disabled message node; See col. 2, lines 45-55 and col. 3, lines 21-66), and determining if control of said link bus can be transferred based on said inspected internal arbitration state and status information (See Abstract).

*Referring to claims 3 and 36*, Frame teaches said internal arbitration state information comprises a current arbitration state (i.e., arbitration phase) selected from one of a park state (i.e., bus idle state 40 in Fig. 2) indicating that there are no requests on said link bus (See col. 3, lines 28-31), grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) indicating that a device (i.e., node) in control of said link bus is transferring information on said link bus, and a grant-other state (i.e., wait phase 48 in Fig. 2) indicating that another device is in control of said link bus (i.e., the current node loses the control of the bus, the another node wins the control of the bus; See col. 2, lines 45-68).

*Referring to claims 4 and 37*, Frame teaches said internal status information comprises a current status value (i.e., current status of node) selected from one of a bus master arbitration request (i.e., arbitration request at  $t_2$  after transfer completion at  $t_1$ ; See col. 3, lines 45-47), bus master transfer in

progress (i.e., reselected arbitration request at  $t_2$  and transfer phase at  $t_2$  after transfer completion at  $t_1$ ; See col. 3, lines 54-66), bus slave arbitration request (i.e., arbitration request at  $t_1$  from enabled message nodes 12 and 16 in Fig. 1 via enabled path 42 of Fig. 2; See col. 3, lines 36-53), and bus slave transfer in progress (i.e., selected arbitration request at  $t_1$  and transfer phase at  $t_1$ ).

*Referring to claims 5 and 41*, Frame teaches said transferring step comprising modifying internal arbitration state and status information (i.e., modifying arbitration phases, such that wait phase 48, selection phases 50, transfer phase 52, etc in Fig. 2) to reflect that said issuing device is a master of said link bus (i.e., winning node to control the bus) and that the other device connected to said link bus is a slave of said link bus (i.e., losing node not to control the bus; See col. 3, lines 21+).

*Referring to claims 6 and 42*, Frame teaches said internal arbitration state information comprising a current arbitration state (i.e., arbitration phase) selected from one of a park state (i.e., bus idle state 40 in Fig. 2) indicating that there are no requests on said link bus (See col. 3, lines 28-31), grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) indicating that a device (i.e., node) in control of said link bus is transferring information on said link bus, and a grant-other state (i.e., wait phase 48 in Fig. 2) indicating that another device is in control of said link bus (i.e., the current node loses the control of the bus, the another node wins the control of the bus; See col. 2, lines 45-68).

*Referring to claims 7 and 43*, Frame teaches said modifying step comprising at said first device (i.e., node 12 in Fig. 1), changing said internal arbitration state to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2); and at said hub device (i.e., node 16 in Fig. 1), changing said internal arbitration state to said grant-other state (i.e., wait phase 48 in Fig. 2; See col. 3, lines 21-53).

*Referring to claims 8 and 44*, Frame teaches said modifying step comprising at said hub device (i.e., node 16 in Fig. 1), changing said internal arbitration state to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2); and at said first device (i.e., node 12 in Fig. 1), changing said internal arbitration state to said grant-other state (i.e., wait phase 48 in Fig. 2; See col. 3, lines 21-53).

*Referring to claim 9*, Frame teaches said modifying step comprising at said first device (i.e., node 12 in Fig. 1), changing said internal arbitration state from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2); and at said hub device (i.e., node 16 in Fig. 1), changing said internal arbitration state from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-other state (i.e., wait phase 48 in Fig. 2; See col. 3, lines 21-53).

*Referring to claims 10 and 45*, Frame teaches said internal status information comprises a current status value (i.e., current status of node) selected from one of a bus master arbitration request (e.g., arbitration request from enabled message node 14 and 16 in Fig. 1 via enabled path 42 of Fig. 2, i.e., enabled arbitration status; See col. 3, lines 1-3), bus master transfer in progress (i.e., transfer phase 52 after the node is selected as an arbitration winner), bus slave arbitration request (e.g., path 44 of Fig. 2 for disabled message node 12 in Fig. 1, i.e., disabled arbitration status; See col. 3, lines 5-8), and bus slave transfer in progress (i.e., wait phase 48 after the node is lost the bus control; a data transfer on the bus is controlled by another node).

*Referring to claims 11 and 46*, Frame teaches said internal arbitration state is changed from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-other state (i.e., wait phase 48 in Fig. 2) if said internal status reflects said bus master arbitration request (i.e., an arbitration request at  $t_2$  after transfer completion at  $t_1$ ) and not said bus slave arbitration request (i.e., not an arbitration request at  $t_1$  from enabled message nodes). Refer to col. 3, lines 45-47, i.e., wherein in fact that after the transfer involving node 12 has been completed, it too is disabled and must wait until the bus is idle for 1600 nsec ( $t_2$ ) implies that said internal arbitration state is changed from said park state to said grant-other state if said internal status reflects said bus master arbitration request and not said bus slave arbitration request.

*Referring to claims 12 and 47*, Frame teaches said internal arbitration state is changed from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) if said internal status reflects said bus slave arbitration request (i.e., arbitration request

at  $t_1$  from enabled message nodes, and the highest priority node wins to control the bus; See col. 3, lines 42-45).

*Referring to claims 13 and 48*, Frame teaches said internal arbitration state is changed from said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) to said grant-other state (i.e., wait phase 48 in Fig. 2) if said internal status reflects said bus slave arbitration request (i.e., arbitration request at  $t_1$  from enabled message nodes) and not said bus slave transfer in progress state (i.e., after completion the bus slave transfer in progress state, caused by a selected arbitration request at  $t_1$  and transfer phase at  $t_1$ ). Refer to col. 3, lines 45-47.

*Referring to claims 14 and 49*, Frame teaches said internal arbitration state is changed from said grant-other state (i.e., wait phase 48 in Fig. 2) to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) if said internal status reflects said bus slave arbitration request (i.e., an arbitration request at  $t_1$  from enabled message nodes, which has been waiting in wait phase 48 in Fig. 2) and not said bus master transfer in progress state (i.e., after completion the transfer phase at  $t_2$ , caused by a reselected arbitration request at  $t_2$  after transfer completion at  $t_1$ ). See Fig. 2 and col. 3, lines 21+ for the operation of the fair arbitration scheme.

*Referring to claims 15 and 50*, Frame teaches said internal arbitration state is changed from said internal arbitration state is changed from said grant-other state (i.e., wait phase 48 in Fig. 2) to said park state (i.e., bus idle state 40 in Fig. 2) if said internal status does not reflect said bus master arbitration request (i.e., no arbitration request at  $t_2$  after transfer completion at  $t_1$ ), said bus slave arbitration request (i.e., no arbitration request at  $t_1$  from enabled message nodes) and said bus master transfer in progress state (i.e., no reselected arbitration request at  $t_2$  and transfer phase at  $t_2$  after transfer completion at  $t_1$ ). Refer to col. 3, lines 45-47, i.e., wherein in fact that after the transfer involving node 12 has been completed, it too is disabled and must wait until the bus is idle for 1600 nsec ( $t_2$ ) implies that said internal arbitration state is changed from said internal arbitration state is changed from said grant-other state to



said park state if said internal status does not reflect said bus master arbitration request, said bus slave arbitration request and said bus master transfer in progress state, i.e., said internal arbitration state is changed from said internal arbitration state is changed from said grant-other state to said park state if the bus is not busy.

*Referring to claim 18*, Kondo teaches said issuing step through said transferring step are performed in accordance with a link bus protocol (i.e., bus protocol of acknowledge type; See col. 5, lines 55-57) of said link bus (See col. 4, line 48 through col. 5, line 10).

*Referring to claim 38*, Kondo teaches said link bus (i.e., system bus 5 in Fig. 12) is a source strobed bus (i.e., source clock signal bus; See col. 1, lines 59-64).

*Referring to claim 57*, Kondo discloses a processor based system (Fig. 12) comprising: a processor (i.e., processor 1 in Fig. 12); a first device (e.g., bus adapter 4 in Fig. 12) connected to said processor by a first bus (i.e., processor bus 3 in Fig. 12); a second device (e.g., module #1 6 in Fig. 12); and a link bus (i.e., system bus 5 in Fig. 12) connected between said first and second devices (See Fig. 12), said link bus comprises a source strobed command/address/data bus (i.e., CAD[0-8] with source clock signal SCLK 203 and LC 206 in a system bus 5 in Fig. 2; See col. 1, lines 59-64), two clock strobes (i.e., SCLK 203 for strobing a source clock and LC 206 for strobing a last cycle in Fig. 2) and a link bus status line (i.e., ACK[0-2] 205 in Fig. 1), said link bus having a link bus protocol (i.e., bus protocol of acknowledge type; See col. 5, lines 55-57), wherein said first and second devices arbitrate control over said link bus and in accordance with said link bus protocol (See col. 4, line 48 through col. 5, line 10) such that control over said link bus (i.e., system bus) is transferred (viz., bus releasing) from a bus master (e.g., module #0 in Fig. 2) to a bus slave (e.g., module #1 in Fig. 2) when said slave is granted control over said bus (See col. 4, lines 60-66).

Kondo does not teach said arbitration is in a decentralized manner.

Frame discloses a fair arbitration scheme (See Abstract), wherein a first device (e.g., node 12 in Fig. 1) and a second device (e.g., node 16 in Fig. 1) arbitrate control over a link bus (i.e., interconnect bus 10 in Fig. 1) in a decentralized manner (See Fig. 1; i.e., each one of nodes has a separate arbitrator and monitor and enabler shows said arbitration is in a decentralized manner) and in accordance with a link bus protocol (i.e., fair arbitration; See col. 2, line 45 through col. 3, line 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied said arbitration scheme, as disclosed by Frame, to said method steps of said bus arbitration, as disclosed by Kondo, for the advantage of reducing inefficiencies created by reserving time each device (i.e., node) to use said link bus (i.e., interconnection bus), achieved by the provision of the method for selecting a particular device (i.e., node) from a plurality of devices (i.e., nodes) connected to said link bus to allow said device to use said link bus (See Frame, col. 1, lines 50-58).

*Referring to claim 58*, Kondo teaches said link bus status line (i.e., ACK[0-2] 205 in Fig. 1) is a tristate status line (i.e., three states on respective signal lines of ACK[0-2] presenting said link bus status).

*Referring to claim 59*, Kondo teaches said first device is a link hub (i.e., bus adapter 4 in Fig. 12) and said second device is a satellite device (i.e., module #1 6 in Fig. 12).

*Referring to claim 60*, Kondo teaches said first and second devices are satellite devices (e.g., modules MODULE #1 6 and MODULE #3 8; i.e., said first and second devices are satellite devices coupled to each other by system bus 5 and coupled to processor 1 via bus adapter 4 and processor bus 3 in Fig. 12).

5. Claims 19-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo [US 6,539,444 B1] in view of Frame [US 5,349,690 A] and Nguyen et al. [US 5,502,821 A; hereinafter Nguyen].

*Referring to claim 19*, most of the claim limitations have already been discussed / addressed with respect to claim 1, with the exception of said link bus being a source strobed bus having a status line, and

the steps of said method further comprising: time-multiplexing, from one of said satellite device and said hub device, an arbitration request signal on said link bus status line; and detecting, at the other of said satellite device and said hub device, said arbitration request signal.

Kondo further teaches said link bus (i.e., system bus 5 in Fig. 12) being a source strobed bus (i.e., source clock signal bus; See col. 1, lines 59-64).

Kondo, as modified by Frame, does not teach said link bus having a status line, and the method steps of time-multiplexing, from one of said satellite device and said hub device, an arbitration request signal on said link bus status line; and detecting, at the other of said satellite device and said hub device, said arbitration request signal.

Nguyen discloses a method of determining devices requesting the transfer of data signals on a bus (See Abstract), wherein a link bus (i.e., local bus 10 in Fig. 2) having a status line (i.e., bus request line 88 in Fig. 5, which is within control line 28 in Fig. 2; See col. 6, lines 16-17), and the method steps of time-multiplexing, from one of a satellite device (e.g., device 14-1 in Fig. 2) and a hub device (e.g., local bus controller 12; i.e., bus request signal from device 14-1 in Fig. 2), an arbitration request signal (i.e., a single bus request signal 88-1 in Fig. 2) on said link bus status line (See col. 6, lines 56-60); and detecting (i.e., matching and determining), at the other of said satellite device and said hub device (i.e., local bus controller 12 in Fig. 1), said arbitration request signal (See col. 6, lines 18-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said status line with said multiplexing scheme, as disclosed by Nguyen, in said link bus of said computer system, as disclosed by Kondo, as modified by Frame, so as to convey information about the readiness of said devices' components, e.g., transmitting/receiving data buffers, which is taught by Nguyen at col. 6, lines 56-59.

*Referring to claim 20*, Frame teaches inspecting internal arbitration state (i.e., monitoring bus idle state 40, wait phase 48 and transfer phase 52 in Fig. 2) and status information (i.e., arbitration loser,

arbitration winner status of enabled message node or disabled message node; See col. 2, lines 45-55 and col. 3, lines 21-66) contained on each of said satellite device and said hub device (i.e., each of nodes; See Fig. 1); and determining if control of said link bus can be transferred based on said inspected internal arbitration state and status information (See Abstract).

*Referring to claim 21*, Frame teaches said internal arbitration state information comprises a current arbitration state (i.e., arbitration phase) selected from one of a park state (i.e., bus idle state 40 in Fig. 2) indicating that there are no requests on said link bus (See col. 3, lines 28-31), grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) indicating that a device (i.e., node) in control of said link bus is transferring information on said link bus, and a grant-other state (i.e., wait phase 48 in Fig. 2) indicating that another device is in control of said link bus (i.e., the current node loses the control of the bus, the another node wins the control of the bus; See col. 2, lines 45-68).

*Referring to claim 22*, Frame teaches said internal status information comprises a current status value (i.e., current status of node) selected from one of a bus master arbitration request (i.e., arbitration request at  $t_2$  after transfer completion at  $t_1$ ; See col. 3, lines 45-47), bus master transfer in progress (i.e., reselected arbitration request at  $t_2$  and transfer phase at  $t_2$  after transfer completion at  $t_1$ ; See col. 3, lines 54-66), bus slave arbitration request (i.e., arbitration request at  $t_1$  from enabled message nodes 12 and 16 in Fig. 1 via enabled path 42 of Fig. 2; See col. 3, lines 36-53), and bus slave transfer in progress (i.e., selected arbitration request at  $t_1$  and transfer phase at  $t_1$ ).

*Referring to claim 23*, Frame teaches said transferring step comprising modifying internal arbitration state and status information (i.e., modifying arbitration phases, such that wait phase 48, selection phases 50, transfer phase 52, etc in Fig. 2) on each of said satellite device (e.g., node 12 in Fig. 1) and said hub device (e.g., node 16 in Fig. 1) to reflect that said issuing device is a master of said link bus (i.e., winning node to control the bus) and that the other device connected to said link bus is a slave of said link bus (i.e., losing node not to control the bus; See col. 3, lines 21+).

*Referring to claim 24*, Frame teaches said internal arbitration state information comprising a current arbitration state (i.e., arbitration phase) selected from one of a park state (i.e., bus idle state 40 in Fig. 2), grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) and a grant-other state (i.e., wait phase 48 in Fig. 2).

*Referring to claim 25*, Frame teaches said modifying step comprising at said satellite device (i.e., node 12 in Fig. 1), changing said internal arbitration state to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2); and at said hub device (i.e., node 16 in Fig. 1), changing said internal arbitration state to said grant-other state (i.e., wait phase 48 in Fig. 2; See col. 3, lines 21-53).

*Referring to claim 26*, Frame teaches said modifying step comprising at said hub device (i.e., node 16 in Fig. 1), changing said internal arbitration state to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2); and at said satellite device (i.e., node 12 in Fig. 1), changing said internal arbitration state to said grant-other state (i.e., wait phase 48 in Fig. 2; See col. 3, lines 21-53).

*Referring to claim 27*, Frame teaches said modifying step comprising at said satellite device (i.e., node 12 in Fig. 1), changing said internal arbitration state from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2); and at said hub device (i.e., node 16 in Fig. 1), changing said internal arbitration state from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-other state (i.e., wait phase 48 in Fig. 2; See col. 3, lines 21-53).

*Referring to claim 28*, Frame teaches said internal status information comprises a current status value (i.e., current status of node) selected from one of a bus master arbitration request (e.g., arbitration request from enabled message node 14 and 16 in Fig. 1 via enabled path 42 of Fig. 2, i.e., enabled arbitration status; See col. 3, lines 1-3), bus master transfer in progress (i.e., transfer phase 52 after the node is selected as an arbitration winner), bus slave arbitration request (e.g., path 44 of Fig. 2 for disabled message node 12 in Fig. 1, i.e., disabled arbitration status; See col. 3, lines 5-8), and bus slave transfer in

progress (i.e., wait phase 48 after the node is lost the bus control; a data transfer on the bus is controlled by another node).

*Referring to claim 29*, Frame teaches said internal arbitration state is changed from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-other state (i.e., wait phase 48 in Fig. 2) if said internal status reflects said bus master arbitration request (i.e., an arbitration request at  $t_2$  after transfer completion at  $t_1$ ) and not said bus slave arbitration request (i.e., not an arbitration request at  $t_1$  from enabled message nodes). Refer to col. 3, lines 45-47, i.e., wherein in fact that after the transfer involving node 12 has been completed, it too is disabled and must wait until the bus is idle for 1600 nsec ( $t_2$ ) implies that said internal arbitration state is changed from said park state to said grant-other state if said internal status reflects said bus master arbitration request and not said bus slave arbitration request.

*Referring to claim 30*, Frame teaches said internal arbitration state is changed from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) if said internal status reflects said bus slave arbitration request (i.e., arbitration request at  $t_1$  from enabled message nodes, and the highest priority node wins to control the bus; See col. 3, lines 42-45).

*Referring to claim 31*, Frame teaches said internal arbitration state is changed from said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) to said grant-other state (i.e., wait phase 48 in Fig. 2) if said internal status reflects said bus slave arbitration request (i.e., arbitration request at  $t_1$  from enabled message nodes) and not said bus slave transfer in progress state (i.e., after completion the bus slave transfer in progress state, caused by a selected arbitration request at  $t_1$  and transfer phase at  $t_1$ ). Refer to col. 3, lines 45-47.

*Referring to claim 32*, Frame teaches said internal arbitration state is changed from said grant-other state (i.e., wait phase 48 in Fig. 2) to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) if said internal status reflects said bus slave arbitration request (i.e., an arbitration request at  $t_1$  from enabled message nodes, which has been waiting in wait phase 48 in Fig. 2) and not said bus

master transfer in progress state (i.e., after completion the transfer phase at  $t_2$ , caused by a reselected arbitration request at  $t_2$  after transfer completion at  $t_1$ ). See Fig. 2 and col. 3, lines 21+ for the operation of the fair arbitration scheme.

*Referring to claim 33*, Frame teaches said internal arbitration state is changed from said internal arbitration state is changed from said grant-other state (i.e., wait phase 48 in Fig. 2) to said park state (i.e., bus idle state 40 in Fig. 2) if said internal status does not reflect said bus master arbitration request (i.e., no arbitration request at  $t_2$  after transfer completion at  $t_1$ ), said bus slave arbitration request (i.e., no arbitration request at  $t_1$  from enabled message nodes) and said bus master transfer in progress state (i.e., no reselected arbitration request at  $t_2$  and transfer phase at  $t_2$  after transfer completion at  $t_1$ ). Refer to col. 3, lines 45-47, i.e., wherein in fact that after the transfer involving node 12 has been completed, it too is disabled and must wait until the bus is idle for 1600 nsec ( $t_2$ ) implies that said internal arbitration state is changed from said internal arbitration state is changed from said grant-other state to said park state if said internal status does not reflect said bus master arbitration request, said bus slave arbitration request and said bus master transfer in progress state, i.e., said internal arbitration state is changed from said internal arbitration state is changed from said grant-other state to said park state if the bus is not busy.

6. Claims 16, 17, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo [US 6,539,444 B1] in view of Frame [US 5,349,690 A] as applied to claims 1-15, 18, 34-38, 41-50 and 57-60 above, and further in view of Nguyen [US 5,502,821 A].

*Referring to claims 16, 17, 39 and 40*, Kondo, as modified by Frame, discloses all the limitations of the claims 16, 17, 39 and 40, respectively, except that does not teach said link bus comprises a link bus status line and said arbitration request is issued by propagating a signal, i.e., an arbitration request signal, on said link bus status line in time-multiplexing.

Nguyen discloses a method of determining devices requesting the transfer of data signals on a bus (See Abstract), wherein a link bus (i.e., local bus 10 in Fig. 2) comprises a link bus status line (i.e., bus request

line 88 in Fig. 5, which is within control line 28 in Fig. 2; See col. 6, lines 16-17) and an arbitration request (i.e., bus request) is issued by propagating a signal, i.e., an arbitration request signal (i.e., a single bus request signal 88-1 in Fig. 2), on said link bus status line (i.e., bus request line) in time-multiplexing (See col. 6, lines 56-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said status line with said multiplexing scheme, as disclosed by Nguyen, in said link bus of said computer system, as disclosed by Kondo, as modified by Frame, so as to convey information about the readiness of said devices' components, e.g., transmitting/receiving data buffers, which is taught by Nguyen at col. 6, lines 56-59.

7. Claims 51, 52, 55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo [US 6,539,444 B1] in view of Nguyen [US 5,502,821 A].

*Referring to claim 51*, Kondo discloses a processor based system (Fig. 12) comprising: a processor (i.e., processor 1 in Fig. 12); a link hub (i.e., bus adapter 4 in Fig. 12) connected to said processor by a first bus (i.e., processor bus 3 in Fig. 12); a satellite device (e.g., module #1 6 in Fig. 12); and a link bus (i.e., system bus 5 in Fig. 12) connected between said link hub and said satellite device (See Fig. 12); and said link bus (i.e., system bus) comprises a link bus status line (i.e., ACK[0-2] 205 in Fig. 1) and having a link bus protocol (i.e., bus protocol of acknowledge type; See col. 5, lines 55-57). Kondo does not teach said satellite device multiplexes an arbitration signal on said link bus status line in accordance with said link bus protocol to become said master during transmissions to said link hub and said link hub multiplexes another arbitration signal on said link bus status line in accordance with said link bus protocol to become a master of said link bus during transmissions to said satellite device, wherein control of said link bus is transferred from said master to a slave device.

Nguyen discloses a method of determining devices requesting the transfer of data signals on a bus (See Abstract), wherein a satellite device (e.g., device 14-1 in Fig. 2) multiplexes an arbitration signal (e.g., a



single bus request signal 88-1 in Fig. 2; See col. 6, lines 56-59) on a link bus status line (i.e., bus request line 88 in Fig. 5, which is within control line 28 in Fig. 2; See col. 6, lines 16-17) in accordance with a link bus protocol (See Fig. 7 and col. 7, lines 11-31; i.e., wherein in fact that the timing relationship between multiplex signal, clock signal and the bus request signal in Fig. 7 implies that said satellite device multiplexes said arbitration signal on said link bus status line in accordance with a link bus protocol) to become a master (i.e., source) of a link bus (i.e., local bus 10 in Fig. 2) during transmissions (i.e., data transfer) to a link hub (e.g., device 14-3 in Fig. 2, i.e., destination) and said link hub (i.e., device 14-3 in Fig. 2) multiplexes another arbitration signal (i.e., a single bus request signal 88-3 in Fig. 2) on said link bus status line (i.e., bus request line 88 in Fig. 5) in accordance with said link bus protocol to become a master (i.e., source) of said link bus during transmissions (i.e., data transfer) to said satellite device (i.e., device 14-1 in Fig. 2, i.e., destination), wherein control of said link bus (i.e., local bus) is transferred (See col. 6, lines 16-17; i.e., wherein in fact that a matching logic determines that a particular pair of source and destination devices is ready for a data transfer implies that control of said link bus is transferred between said link hub and said satellite device) from said master (i.e., source, e.g., device 14-1 (i.e., satellite device) or device 14-3 (i.e., link hub) in Fig. 2) to a slave device (i.e., destination, device 14-3 (i.e., link hub) or device 14-1 (i.e., satellite device) in Fig. 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said status line with said multiplexing scheme, as disclosed by Nguyen, in said link bus of said processor based system, as disclosed by Kondo, so as to convey information about the readiness of said devices' components, e.g., transmitting/receiving data buffers, which is taught by Nguyen at col. 6, lines 56-59.

*Referring to claim 52*, Kondo teaches said link bus (i.e., system bus 5 in Fig. 12) is a source strobed bus (i.e., source clock signal bus; See col. 1, lines 59-64).

*Referring to claim 55*, Nguyen teaches said arbitration signals (i.e., said single bus request signal 88-1 and 88-3 in Fig. 2) are time multiplexed (See Fig. 7; i.e., multiplex signal for Source Bus Request time or multiplex signal for Destination Bus Request) on said link bus status line (i.e., bus request line 88 in Fig. 5 ) during a predetermined time window (i.e., during a predetermined time window for Source Bus Request or Destination Bus Request).

*Referring to claim 56*, Nguyen teaches said link bus status line (i.e., bus request line 88 in Fig. 5 ) is used to transmit status information (i.e., to convey bus request signals) between said link hub and said satellite device (See col. 6, lines 40-55).

8. Claims 53 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo [US 6,539,444 B1] in view of Nguyen [US 5,502,821 A] as applied to claims 51, 52, 55 and 56 above, and further in view of Singh et al. [US 6,609,171 B1; hereinafter Singh].

*Referring to claim 53 and 54*, Kondo, as modified by Nguyen, discloses all the limitations of the claims 53 and 54, respectively, except that does not teach said link bus is one of a quad pumped source strobed bus and a double pumped source strobed bus.

Singh discloses a multi-pumped signaling mode operation (See col. 6, lines 33+), wherein a link bus (i.e., processor bus 117 in Fig. 2) is one of a quad pumped source strobed bus (See col. 6, lines 43+) and a double pumped source strobed bus (See col. 11, lines 14+) according to a multi-pumped signaling mode (See col. 6, lines 33+).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have implemented said means for signaling multi-pumped bus (e.g., strobe generator, strobe signal lines, and multi-pumped signaling mode controller), as disclosed by Singh, on said link bus and its connected devices (i.e., bus adapter and module), as disclosed by Kondo, as modified by Nguyen, for the advantage of increasing bus throughput by operating said link bus in the multi-pumped signaling mode (See Singh, col. 2, lines 39-42).

***Response to Arguments***

9. Applicant's arguments, see Response filed on 19<sup>th</sup> of December 2003 (hereinafter the Response), page 18, line 23 through page 19, line 4, , with respect to the claim objection of the claim 55 have been fully considered and are persuasive. Therefore, the objection of the claim 55 has been withdrawn.

However, the ground of claim rejection under 35 U.S.C. 103(a) as being unpatentable Kondo in view of Nguyen is maintained since both of the subject matter "an arbitration signal" and the subject matter "another arbitration signal" are arbitration signals on the link bus status line with link bus protocol, and either one of arbitration signals is multiplexed on the link bus status line during a predetermined time window (i.e., during transmission to the satellite device or to the link hub) in light of the parent claim 51.

10. The Applicant's arguments on the Response have been fully considered but they are not persuasive except the above arguments.

*In response to the Applicant's argument with respect to "Claim 1 recites a ... Initially, Applicant notes that according to the Office Action, Kondo does not teach, suggest or disclose 'determining, at the first device ...' Applicants respectfully submit that this is almost all of the limitations recited in claim 1. Apparently, Kondo is being relied upon merely for the teaching of a computer system that uses arbitration and has a hub."* on the Response page 19, line 23 through page 20, line 15, the Examiner respectfully disagrees. In contrary to the Applicant's statement, the limitations, which are described on the above argument, are not almost all of the limitations recited in claim 1. Actually, the Applicant further claims the following limitations using the transitional phrase "comprising", i.e., 'the processor based system comprising a hub device coupled to a processor by a processor bus and coupled to a memory device by a memory bus, said hub device being connected to a first device by a link bus' in lines 1-4 of the exemplary claim 1. Therefore, Kondo is not being relied upon merely for the teaching of a computer system that uses arbitration and has a hub, but is teaching the subject matter of the Applicant's claimed invention, i.e., 'said processor based system'. Thus, the Applicant's argument on this point is not persuasive.

*In response to the Applicant's argument with respect to* "Since Kondo does not teach, suggest or disclose most of the method steps recited in claim 1, ... Frame does not disclose, teach or suggest a processor system comprising a hub, memory device or a link bus as recited in claim 1. ... Thus, the combination of Kondo and Frame fails to teach or suggest these claim 1 elements." on the Response page 20, lines 16-25, the Examiner believes that the Applicant misinterprets the claim rejection.

The Applicant essentially argues that Frame doesn't teach the above argued elements, i.e., 'a processor system comprising a hub, memory device or a link bus', 'determining, ... whether control of the link bus can be transferred' and 'transferring control of the link bus'. However, Kondo suggests a processor system comprising a hub, memory device or a link bus, and Frame suggests the limitations 'determining, ... whether control of the link bus can be transferred' and 'transferring control of the link bus'.

Therefore, the combination of Kondo and Frame with rationale for properly combining of the references suggests all the limitations of the claimed invention. Furthermore, in fact, the arbitration does not perform the step of transferring control of a bus (e.g., link bus), but do perform the step of determining which requesting device will gain access to a resource (e.g., bus; i.e., the means whereby masters compete for control of the bus and the process by which a master is granted control of the bus; Refer to "IEEE 100 The Authoritative Dictionary of IEEE Standards Terms", 7<sup>th</sup> Ed. published by IEEE). In other words, the claim language "transferring control of the link bus" could be considered as allowing a device (i.e., winning node) to use the bus (i.e., interconnect bus), which is taught by Frame. Thus, the Applicant's argument on this point is not persuasive.

*In response to the Applicant's argument with respect to* "Moreover, the Frame computer system never determines ... Similarly, Frame's computer system does not transfer 'control of the link bus from the bus master to the device issuing the arbitration request.' ... As such, Frame never deals with the situation of having to transfer control away from an existing bus master. ... As such, Frame and Kondo

cannot teach or suggest the steps of ‘determining, at the first device and ...’” on the Response page 21, lines 1-19, the Examiner respectfully disagrees.

In fact, the arbitration does not perform the step of transferring control of a bus (e.g., link bus), but do perform the step of determining which requesting device will gain access to a resource (e.g., bus; i.e., the means whereby masters compete for control of the bus and the process by which a master is granted control of the bus; Refer to “IEEE 100 The Authoritative Dictionary of IEEE Standards Terms”, 7<sup>th</sup> Ed. published by IEEE). In other words, the claim language “transferring control of the link bus from the bus master to the device issuing the arbitration request” could be considered as releasing and granting (viz., transferring control) of a system bus (i.e., link bus) from a module #0 (i.e., bus master) to a module #1 (i.e., device) issuing an arbitration request, which is taught by Kondo.

And, in contrary to the Applicant’s statement, Frame suggests ‘determining whether control of the link bus can be transferred from a bus master to the device issuing the arbitration request’, such that determining which enabled node has the highest priority (i.e., determining) whether use the interconnect bus (i.e., control of a link bus) can be transferred from a prior bus winning device node (i.e., bus master) to a newly winning device, which has a higher priority, among the enabled message nodes (i.e., device) issuing an arbitration request (See Frame, col.2, lines 29-44).

Furthermore, it is noted that the features upon which applicant relies (i.e., the situation of having to transfer control away from an existing bus master) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). However, Frame deals with the situation of having to transfer control away from a bus master (i.e., Frame shows that the previous node (i.e., a bus master) released the interconnect bus for making bus idle condition, then the newly winning node is allowed to use the interconnect bus (See col. 2, lines 45-51), which fully suggests

the situation of having to transfer control away from a bus master). Thus, the Applicant's argument on this point is not persuasive.

*In response to the Applicant's argument* that the Examiner's conclusion of obviousness for the 35 USC §103(a) rejection fails to establish a *prima facie* case of obviousness on the Response, page 21, lines 20-24, the Examiner respectfully disagrees.

In contrary to the Applicant's statement, all the rejections under 35 USC §103(a) in the prior and the instant Office Action established a *prima facie* case of obviousness meeting the three basic criteria of the M.P.E.P. 2143.03 (8<sup>th</sup> ed. 2001). See the Office Action mailed on 30<sup>th</sup> of September 2003. Furthermore, the Examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the Examiner has clearly pointed out rationale for appropriate combination of the references. Thus, the Applicants' argument on this point is not persuasive.

*In response to the Applicant's argument with respect to* requesting withdrawal of the claims 1-15, 18, 34-38, 41-50 and 57-60 rejections on the Response page 22, the Examiner respectfully disagrees. In contrary to the Applicant's statement, the claims 1-15, 18, 34-38, 41-50 and 57-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo in view of Frame. (See paragraph 4 of the instant Office Action). Thus, the Applicant's argument on this point is not persuasive.

*In response to the Applicant's argument that* the Examiner's conclusion of obviousness is based upon improper hindsight reasoning on the Response, page 23, lines 1-13, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time

the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

In this case, Kondo suggests the claimed subject matter "a hub system", such that a system comprising a bus adapter 4 in Fig. 12 (i.e., hub device, which is a link hub) coupled to a processor 1 in Fig. 12 (i.e., processor) by a processor bus 3 in Fig. 12 (i.e., processor bus) and coupled to a main memory 2 in Fig. 12 (i.e., memory device) by a memory bus 11 in Fig. 12 (i.e., memory bus), and Frame suggests the claimed subject matter "a decentralized arbitration scheme", such that a fair arbitration scheme, wherein a node 12 in Fig. 1 (i.e., first device) and a node 16 in Fig. 1 (i.e., second device) arbitrate control over an interconnect bus 10 in Fig. 1 (i.e., link bus) in a decentralized manner (See Fig. 1; i.e., each one of nodes has a separate arbitrator and monitor and enabler shows said arbitration is in a decentralized manner). The Examiner believes that it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, and the Examiner states the source of the proper motivation to combine the prior art. Therefore, the combination of Kondo and Frame is proper. Thus, the Applicant's argument on this point is not persuasive.

*In response to the Applicant's argument with respect to requesting withdrawal of the claims 16, 17, 19-33, 39, 40 and 51-56 rejections on the Response pages 23-26, the Examiner respectfully disagrees.*

11. In contrary to the Applicant's statement, the claims 16, 17, 19-33, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo in view of Frame and Nguyen (See paragraphs 5 and 6 of the instant Office Action), the claims 51, 52, 55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo in view of Nguyen (See paragraph 7 of the instant Office Action), and the claims 53 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo in view of Nguyen and Singh (See paragraph 8 of the instant Office Action).

Furthermore, the Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references. Thus, the Applicant's argument on this point is not persuasive.

### ***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher E. Lee whose telephone number is 703-305-5950. The examiner can normally be reached on 9:00am - 5:00pm.

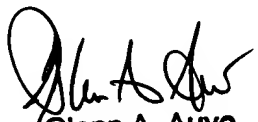
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark H. Rinehart can be reached on 703-305-4815. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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